



## Single and binary adsorption of copper and nickel metal ions on nano zero valent iron (nZVI): a kinetic approach

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### ABSTRACT

There is serious concern regarding copper and nickel, due to their persistent, non-biodegradable and toxic characteristics. This present study concerns the adsorption of copper (Cu(II)) and nickel (Ni(II)) ions onto nano zero valent iron (nZVI) from single and binary systems. Apart from low efficiency conventional adsorbents, nanoparticles such as nZVI and carbon nanotubes are promising adsorbents, as they have a higher adsorbent surface area and nano sized pores. Removal efficiencies are investigated for single and binary adsorption by considering the initial concentrations of copper and nickel. While the removal of copper was as high as 92% with the absence of nickel ion in aqueous solution, it decreased to 61% with 50 mg/L nickel ion concentration. Likewise, the 88% removal rate of nickel ion with the absence of copper, decreased to 70% with 50 mg/L copper ion concentration. Higher metal ion concentrations achieved even poorer results, by having 26% of removal efficiency, or less. It was also observed that the adsorption capacity of copper ion was higher than nickel ions in the binary system. For the highest total metal ion concentrations (300 mg/L), the adsorption capacity obtained was 960 mg/g in the binary system.

*Keywords:* Adsorption; Nano-zero valent iron (nZVI); Nickel removal; Copper removal

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